

Local Chicken Farming in Burkina Faso: Current Situation

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Abstract:- The local chicken is of great economic and socio-cultural importance in Burkina Faso. However, this breeding is not well documented. The purpose of this study is to provide an overview of this activity, which is becoming increasingly important in both rural and peri-urban areas. A socio-economic survey was therefore conducted on 750 people in the three agro-ecological zones of the country. The study revealed that poultry farming is practiced by 66% of men and 34% of women; 45% of them have not received formal education and 35.33% of them are literate in local languages. Among the respondents, 39.47% have been trained in animal husbandry and 21.47% are members of farmers' organizations. Twenty percent of respondents are large-scale producers who raise chickens exclusively. Among the small producers, 70% of them operate a mixture of poultry species, while 30% are exclusively involved in chicken. In terms of morpho-biometrics, local chickens weigh an average of 0.82kg with a maximum of 1.850kg. A strong correlation was found between the weight and the length of the neck-cloaca ($r = 0.50$), the weight and the age of the subjects ($r = 0.53$). Local chicken farming in Burkina is characterized by a strong tendency to semi-divide (42%). The constraints noted for the activity are diseases (35.2%), access to raw materials for food, financing and lack of infrastructure, and unfair competition (14%). This study identified the strengths and weaknesses of poultry farming in three agro-ecological zones of Burkina Faso.

Keywords: Poultry Farming ; Agro Ecological Zone ; Burkina Faso.

I. INTRODUCTION

The global economic context remains marked by increasing unemployment, poverty, and health and food insecurity, which requires a deployment of efforts in favor of the recovery of the primary sector, particularly agriculture, livestock and fisheries. Thus, to meet the demand for meat products, about 45 million producers in developed countries and 1.3 billion in developing countries work in the livestock

sector [10]. Indeed, livestock accounts for 40% of the world's agricultural production. The livestock sector in developing countries accounts for more than one third of the agricultural gross domestic product [28]. Livestock production is exported to countries in the sub-region such as Togo, Côte d'Ivoire and other African countries. Given the vulnerability of large livestock to climatic and sanitary hazards, strategies have been reoriented towards the improvement of short-cycle animals, particularly poultry [20]. Indeed, poultry farming, a short-cycle livestock production, represents a boon for achieving food self-sufficiency. In West Africa, Senegal, Ghana, Nigeria, Burkina Faso and Togo have experienced a boom in this sector. In Togo, policies are aimed at supporting this sector, which is seeing its potential grow. In Burkina Faso, livestock is the second most important resource in the primary sector after agriculture, contributing approximately 10 to 20% of GDP [9]. The poultry sector in Burkina Faso has a population of approximately 44 million head of poultry and is divided into two sectors: a particularly active traditional sector (90% of the livestock) whose producers are farmers, and a modern sector [20]. Due to its numerous potentialities (hardy species, easier production and requiring little investment, accessible to all), traditional poultry farming occupies an important place in the quest for self-sufficiency and sustainability of food security by contributing to the livelihood of rural populations on religious, social, economic and cultural levels [9]; [3]; [2]. Despite this importance, local poultry production remains deficient in relation to the needs of the population. This deficit is due to the low productivity of the local chicken commonly called "bicycle chicken". Indeed, the production of this local chicken, whose meat is much more appreciated than that of the fast-growing conventional chicken, is undermined by its genetic potential and the availability of food resources that do not favor rapid growth [1]; [14]; [26]; [25]; [17]; [23].

The general objective of this work is to characterize local chicken farming in Burkina Faso in order to determine the constraints and levers of this activity.

II. MATERIAL AND METHODS

➤ Study Area:

This study was conducted in the three agro-ecological zones of Burkina Faso (Figure 1):

- The Sudanian zone, located in the south between 10° and 11°30'N latitude with a rainfall between isohyets 1200 to 900 mm;
- The Sudano-Sahelian zone, located between 11°30' and 14° North latitude with a rainfall between 900 and 600 mm and
- The Sahelian zone located north of 14° latitude North with a rainfall of 600 mm [7]. These choices are justified by the climatic diversity that has a strong impact on livestock activities.

In terms of agricultural and livestock production, the Sahelian zone is characterized by semi-extensive to nomadic livestock production, with cereal production being the mainstay. Human activities are essentially gold panning and the gum arabic trade. In the northern Sudanian area, domestic to peri-urban livestock coexist with cereal farming (sorghum, rice, millet), groundnuts, and potatoes. It is a place of sedentarization and small cross-border trade. The southern Sudanian zone is a reception and transhumance zone with high production of corn, sorghum, tubers, yams, and cassava. It is an area of high human activity based on tourism, forests, shea nuts, etc. [7]. [7].

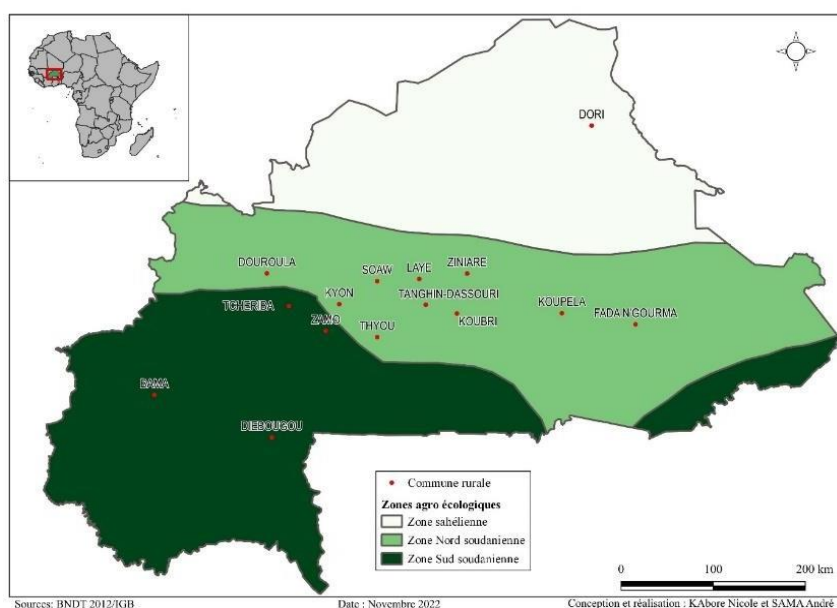


Fig 1 Representative Map of the Agro-Ecological Zones of Burkina Faso and the Surveyed Communes

➤ Data Collection and Analysis:

A cross-sectional survey was conducted from December 2019 to March 2020 in the three (03) agro ecological zones of the country. The sampling was carried out using the "snowball" method [8] with individual interviews by linkage screening where individuals in the initial sample were asked to identify acquaintances who should have useful information, who in turn identified the next respondent.

A total of 750 producers were surveyed (600 in the North Sudanese zone, which has a high potential for short-cycle livestock production, 50 in the Sahelian zone, given the security situation, and 100 in the South Sudanese zone, which has a high potential for crop production but whose livestock production is not as well developed as in the North Sudanese zone). These selection criteria for the producers were three categories, including industrial, semi-industrial and traditional. The questions concerned the socio-demographic characteristics of the producers, the typology of the farms surveyed, the phenotypic characteristics of the local chickens encountered, the feeding method, the types of raw

materials used, veterinary monitoring, biosecurity, socio-economic parameters, the different uses of the products of the farm, the difficulties and recommendations of the producers.

The collected data were processed and analyzed with the SPSS software version 25.0 where parameters of position and dispersion of the statistical series were revealed while the R software version 4.1.0 was used to compare, on the one hand, the quantitative dependent variables of the levels of the agro-ecological zones factor by an analysis of variance at the 5% threshold and when a significant difference is found, a PPDS segregation test is used for the comparison of the means; on the other hand, a linear statistical link is tested between the other quantitative variables by a Principal Component Analysis. Then, a Chi-square test of independence and a two-tailed Z test were used to compare the frequencies of the categorical variables. Finally, a multivariate analysis of the categorical variables was used to highlight the correspondences of the characteristics described.

III. RESULTS

➤ *Socio-Demographic Characteristics:*

Under the conditions of the study and according to the sample considered, the gender of the respondents does not significantly influence the number of flocks (Table 1). For all respondents, 66% of the local chickens in Burkina Faso are kept by men, with variations according to the study area: 64%, 60% and 80% respectively in the northern Sudanian and Sahelian zones and in the southern Sudanian zone. In fact, statistically there is no significant difference in the distribution of respondents by gender in the northern Sudanian and Sahelian zones.

The analysis of other socio-demographic characteristics for the entire study population shows an over-representation of married people (72%) compared to single people (28%). There is also a predominance of uneducated farmers (44.9%), followed by those with secondary (34.4%), higher (19.74%) and primary (0.9%) education. However, it should be noted that 35.33% of the non-educated herders have taken literacy courses in local

languages. In addition, only 21.74% of farmers belong to farmers' organizations. For the level of education and literacy, the proportions are statistically identical for the three study areas. Only 39.47% of producers have received training in poultry farming; the proportion recorded in relation to training in poultry farming varies from one agro-ecological zone to another. Indeed, 40.33%, 58% and 25% of farmers have been trained in poultry farming, respectively for the Northern Sudanian, Sahelian and Southern Sudanian zones.

In terms of labor force, there is no significant difference between the Sahelian and South Sudanese zones, but there are significant differences with the proportions in the North Sudanese zone for both family labor (Table 1).

In general, the analysis of socio-demographic characteristics shows that women's participation in poultry farming is lower than that of men, with a relatively acceptable level of training, although membership in farmers' organizations, the level of education and literacy are not very satisfactory.

Table 1 Socio-Demographic Characteristics

Variables	Modality	Percentage			Global
		North Sudanese	South and North Sahel	South Sudanese	
Gender	Male	64,16a	60a	80b	66
	Woman	35,84a	40a	20b	34
Marital status	Single	27	32	32	28
	Married	73	68	68	72
Level of education	No	43,5	48	52	44,9
	Primary	1	0	1	0,9
	Secondary	36,33	30	25	34,4
	Superior	19,16	22	22	19,74
Literate in local language	Literate	34,16	40	40	35,33
	Non-literate	65,83	60	60	64,67
Workforce	Family	83a	100a	99a	94
	Employee	0,5a	0a	1a	0,53
	Family and employee	16,5a	0b	0b	13,2
Training in poultry farming	Formed	40,33a	58b	25c	39,47
	Not trained	59,67a	42b	75c	60,53
Membership in a Peasant Organization	Belongs to	20,33a	26a	26a	21,47
	Does not belong	79,67a	74a	74a	78,53

➤ *Poultry Species Found on Farms in Burkina Faso:*

Figure 2 presents the proportions of respondents according to the species of poultry raised in Burkina according to the farms encountered. The survey revealed that chicken farmers are the most important; they represent 44%, followed by chicken and guinea fowl farmers (20%), then chicken, ducks and others (14%); chickens and ducks (13%); chickens and others (8%); and chickens, guinea fowl and others (1%). The chicken is therefore the species that is raised in the majority.

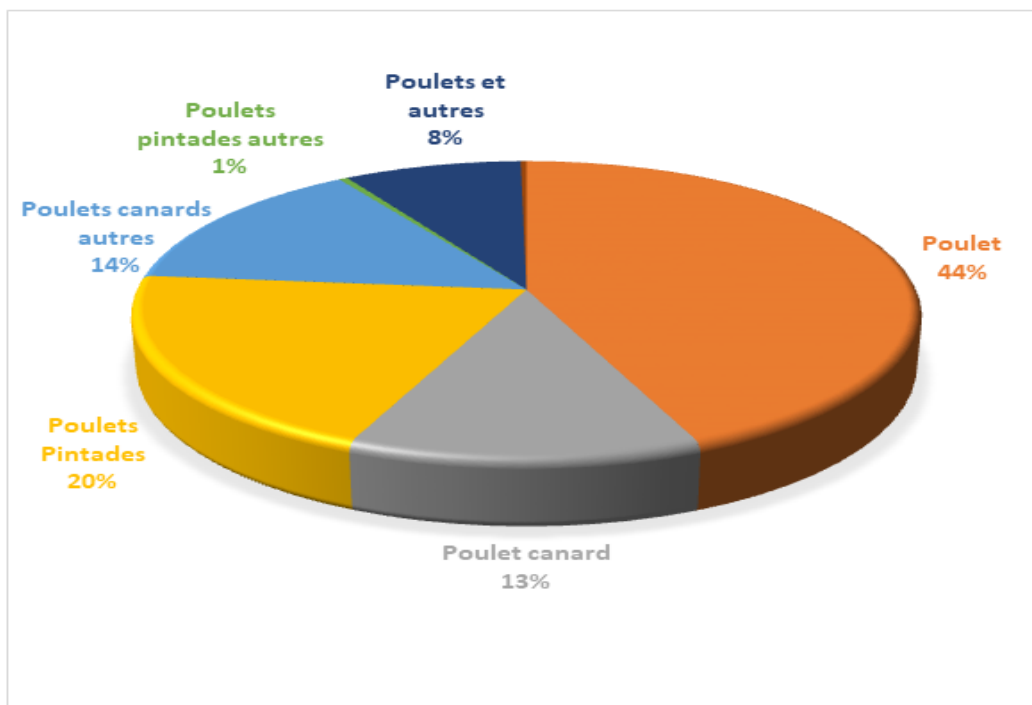


Fig 2 Poultry Species Raised

Table 2 Shows the Poultry Species Found on Farms in Burkina Faso.

Variables	Age(Months)	Weight(Kg)	Lg Neck-Cloaq(Cm)	Lg Legs(Cm)	Height(Cm)
Age(Months)	1	0,5268	0,5018	0,2800	0,5087
Weight(Kg)	0,5268	1	0,2805	0,1328	0,2760
Lg Neck-Cloaq(Cm)	0,5018	0,2805	1	0,6953	0,9594
Lg Legs	0,2800	0,1328	0,6953	1	0,7772
Height(Cm)	0,5087	0,2760	0,9594	0,7772	1



Fig 3 Illustration of Poultry Farming Types

Legend: ^a Naked-necked chicken; ^b Mixed species of poultry in farming; ^c Turkeys; ^d Geese

➤ *Morpho-Biometric Characterization of the Animals:*

Morpho-biometric characteristics Principal Component Analysis of the morpho- biometric parameters of the poultry populations on the factorial map allowed to highlight the nature of the links between the variables (Figure 4).

The first two dimensions of the PCA summarize 84.45% of the information of which 61.65% for axis 1 and 22.80% for axis 2. The analysis of the graph of variables shows that the weight is strongly positively correlated with the age on the one hand, the neck-cloaca length is positively correlated with the height but also with the length of the legs on the other hand.

If strong correlations are perceptible by pair or by triplet of values, it should be noted that all these ranges of values are all correlated.

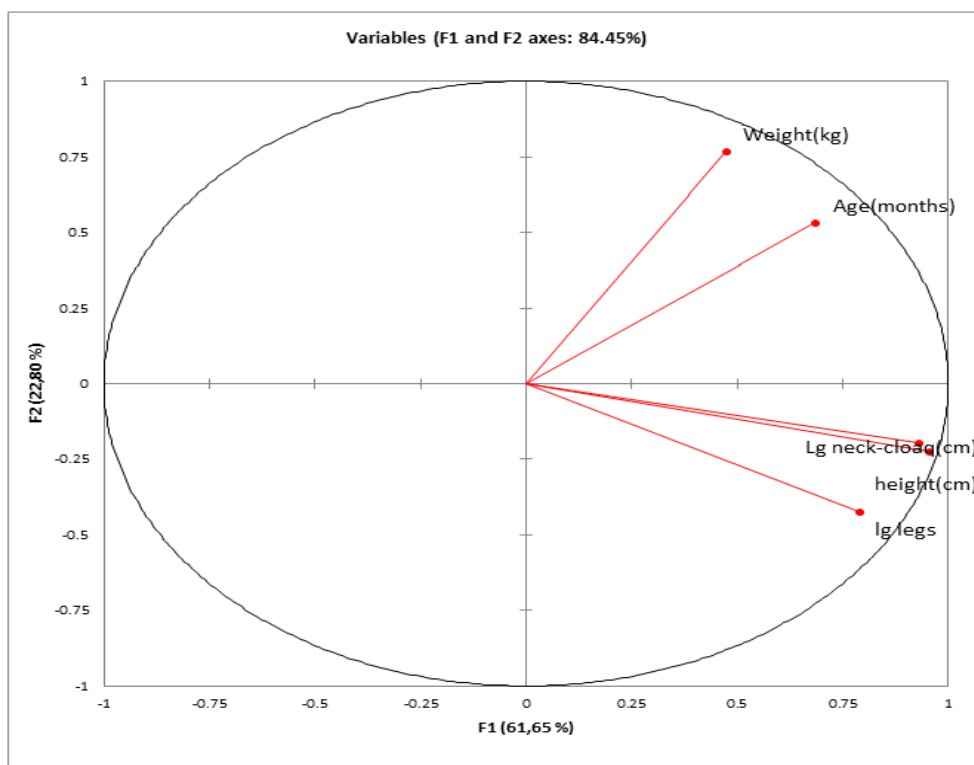


Fig 4 Highlight the Nature of the Links between the Variables

➤ *Typology of the Farms:*

Analysis of the parameters characterizing the typology of livestock farming reveals that the most common livestock farming method is semi-divagation (Table 2), with the North Sudanian (35.67%), Sahelian (50%) and South Sudanian (47%) zones. More than half of the producers own a poultry house, with 98.67% in the North Sudanese zone, 100% in the Sahelian zone and 98% in the South Sudanese zone. The majority of poultry houses are of the traditional type in the northern Sudanian zone (42.33%) and southern Sudanian zone(38%) and improved in the Sahelian zone (36%).

Purchasing is the main method of supplying raw materials: 70.17% in the North Sudanese zone; 68% in the South Sahelian and North Sahelian zones; and 67% in the South Sudanese zone; followed by the own production-purchase method (13.83%, 16% and 17% respectively for the three zones, in the order mentioned above) On average, 90% of producers vaccinate their poultry and 28% in the Sahelian zone clean their poultry regularly.

North Sudanese and 42% for the Sahelian and South Sudanese zones.

Table 3 Typology of Farms

Parameters	Terms and conditions	Agroecological zones			Total
		North Sudanese	South and North Sahel	South Sudanese	
Breeding method	Total divagation	0	40	42	36,8
	Semi-division	35,67	50	47	42
	Total Claustration	40,5	10	11	20,93
	Total divagation seedling divagation	23,5	0	0	0,27

Presence of poultry house	Yes	98,67	100	98	98,67
	No	0,33	0	2	1,33
Type of chicken house	Traditional	42,33	32	38	41,07
	Improved	1,33	36	29	26,93
	Modern	25,83	32	33	31,73
	Improved traditional	31,5	0	0	0,27
Access to raw material	Free access	0,33	16	16	14,27
	Purchase	70,17	68	67	69,6
	Self-purchase access	13,83	16	17	16,13
Vaccination	Yes	91,33	90	89	90,93
	No	16	10	11	9,07
Cleaning frequency	Rarely	8,67	24	27	23,47
	Occasionally	22,83	34	31	28,8
	Regularly	28	42	42	47,73

Figure 5 Shows the Different types of Buildings Encountered in Livestock Farming.



Fig 5 Illustration of the types of Poultry Buildings Encountered

Legend: ^aPermanent Banco Building; ^b Round Hut in the Bobo-Dioulasso Fulani Zone; ^c Permanent Material Building; ^dInstallation of Automatic Feeding and Watering Systems

➤ *Power Supply:*

The most used raw materials in order of importance are corn (rate), soybean meal (rate), and fish meal. A comparison of the averages of the quantities of raw materials that can be used by rural producers reveals that the largest quantities of raw materials are maize, soybean cake and fish meal (which show no significant difference between the agro-ecological zones ($P > 0.05$)). The quantities of cotton cake show significant differences between the North Sudanian and Sahelian zones (220.1 kg#64.46kg). For the quantities of bran used, there are significant differences between the North Sudanese and Sahelian zones, as well as the South Sudanese zone (308.603kg#173.2kg and 213.35kg). It must be said that maize is the most used raw material in terms of ingredient for poultry feed, but this does not prevent its competitiveness in terms of use compared to other raw materials such as the protein sources considered here from being significant because it is expensive and is becoming more and more inaccessible for animal consumption.

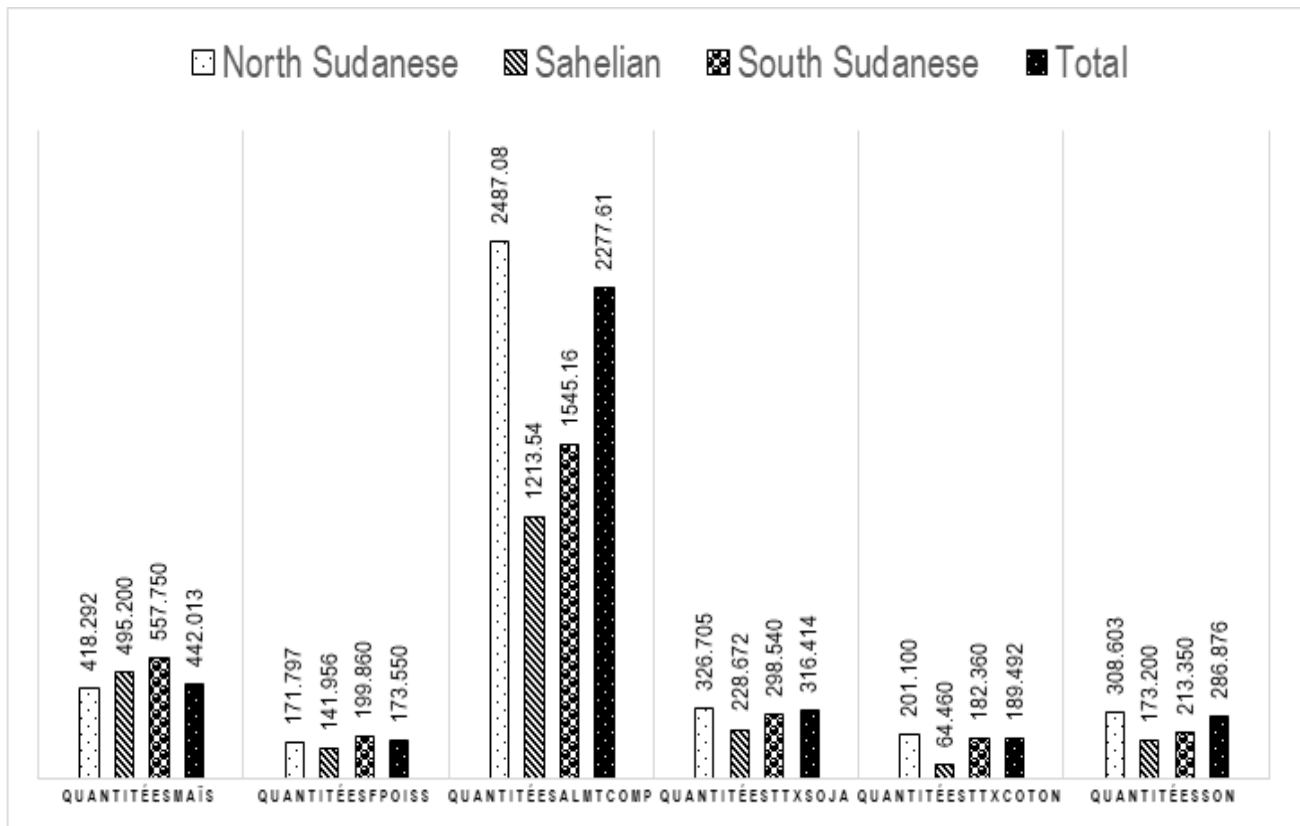


Fig 6 Graph Illustrating the Availability of Raw Materials used in Poultry Feed

➤ *Health:*

The one-way Analysis of Variance (ANOVA) of the parameters related to the health of the reared birds indicated that the average mortality rate was 14.2 ± 9.73 . This rate varied according to the season, from 6.72 ± 4.96 in the hot season to $21.83 \pm xx$ in the harmattan season (Table 4). This rate varied by season, ranging from 6.72 ± 4.96 in the hot season to $21.83 \pm xx$ in the harmattan season (Table 4). The warm season has the lowest mortality rate.

However, it should be noted that 105 of the 750 individuals surveyed did not experience any mortality problems. The maximum is 80% in harmattan and this concerns mainly chicks. In summary, it must be said that the harmattan period is severe for poultry farming.

Table 4 Description of Mortality Rates by Season

Periods	N	Average	Minimum	Maximum
Harmattan	335	$21,83 \pm 6,13$	0,4	80
None	105	0	0	0
Hot season	101	$6,72 \pm 4,97$	0	15
Wet Season- Harmattan	209	$12,71 \pm 8,34$	7	75
Total	750	$14,2 \pm 9,73$	0	80

➤ *Socio-Economic Characteristics:*

The Principal Component Analysis of the socio-economic parameters of the populations surveyed on the factorial map made it possible to highlight the nature of the relationships between the variables (Figure 7).

The first two dimensions of the PCA summarize 39.06% of the information, of which 25.82% for dimension 1 and 13.24% for dimension 2.

It suggests that the prices of droppings, the number of chickens, the price of eggs and the annual revenues are highly correlated. This indicates a relationship between the number of chickens, eggs laid, prices formed in the market and annual revenues. Thus we find that the number of eggs sold as well as its market price, with respect to the representation by the \cos^2 , is even more correlated with annual revenues than the previous group of values. This can be explained by the number of laying eggs placed on the market. Indeed, producers of eggs for consumption have been the ones most encountered in modern chicken farms.

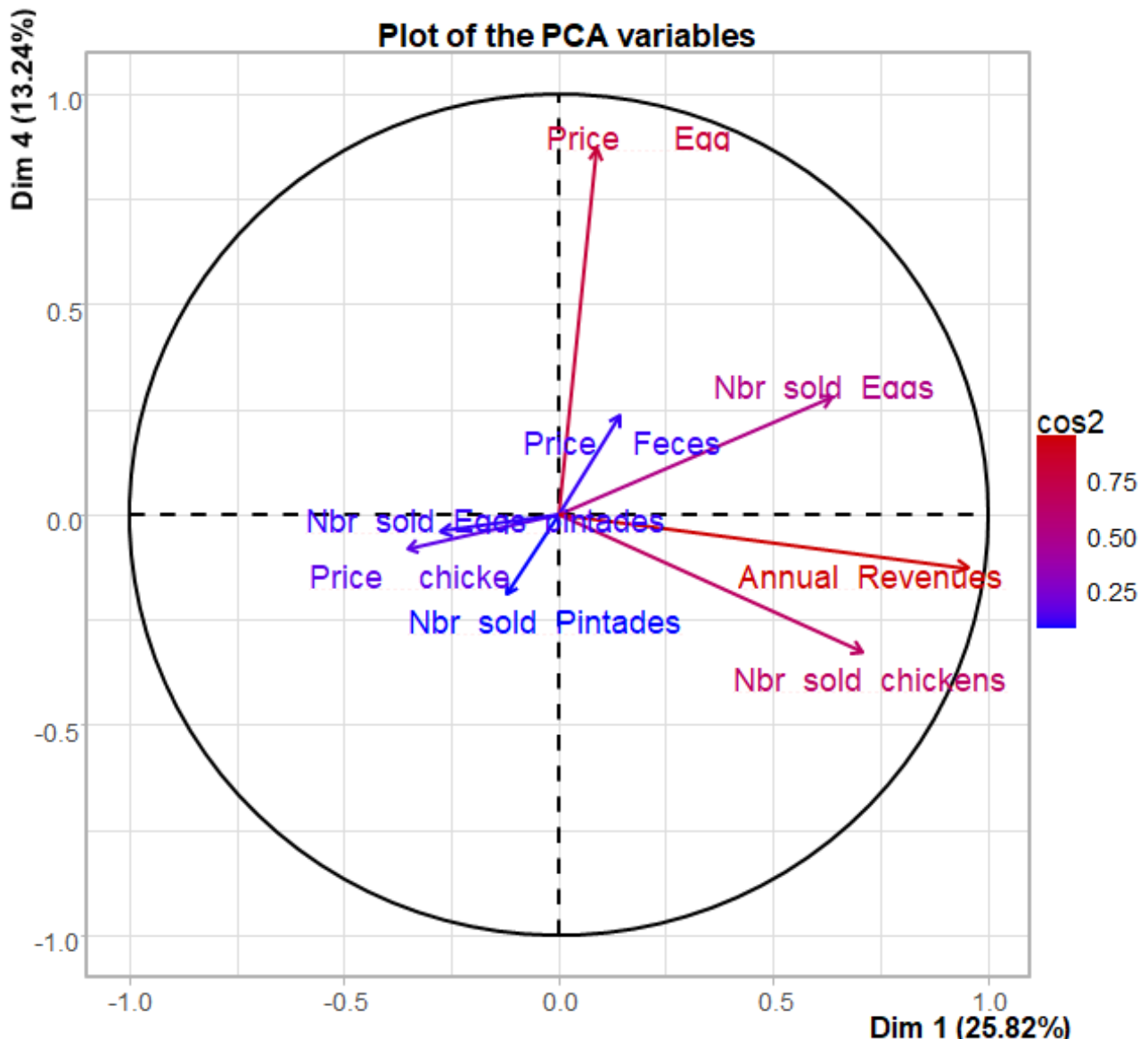


Fig 7 Factor Map of Poultry Commodity Price Formation in the Market

The analysis of diversity by the hierarchical classification performed structures the individuals in 5 classes.

- **Class 1:** is composed of individuals who share a large "number of guinea fowl eggs sold" and a high price for chicken, but a low price for droppings, and a small number of chickens sold resulting in low annual revenues.
- **Class 2:** is composed of individuals with a high activity in selling guinea fowl as evidenced by the "Number of guinea fowl sold, the price of droppings and the price of chicken, however, low values for annual revenues are observed due to the low values in number of eggs and hens.
- **Class 3:** is composed of individuals with increasingly low economic activity in poultry, illustrated by low values for variables such as manure price, annual revenue, number of chickens and guinea fowl sold, number of chicken eggs and guinea fowl sold, egg price and chicken price.
- **Class 4:** is composed of individuals characterized from a socio-economic point of view by a high production of chickens sold, a high price of droppings due to the intensiveness of the activity, the price of eggs as well as that of chicken. These producers are specialized in the production and sale of chickens specifically.
- **Class 5:** is composed of individuals whose main socioeconomic activity is the production and sale of chicken eggs, hence the high values of annual revenues as shown in Figure 8, where we notice that these two parameters are strongly positively correlated.

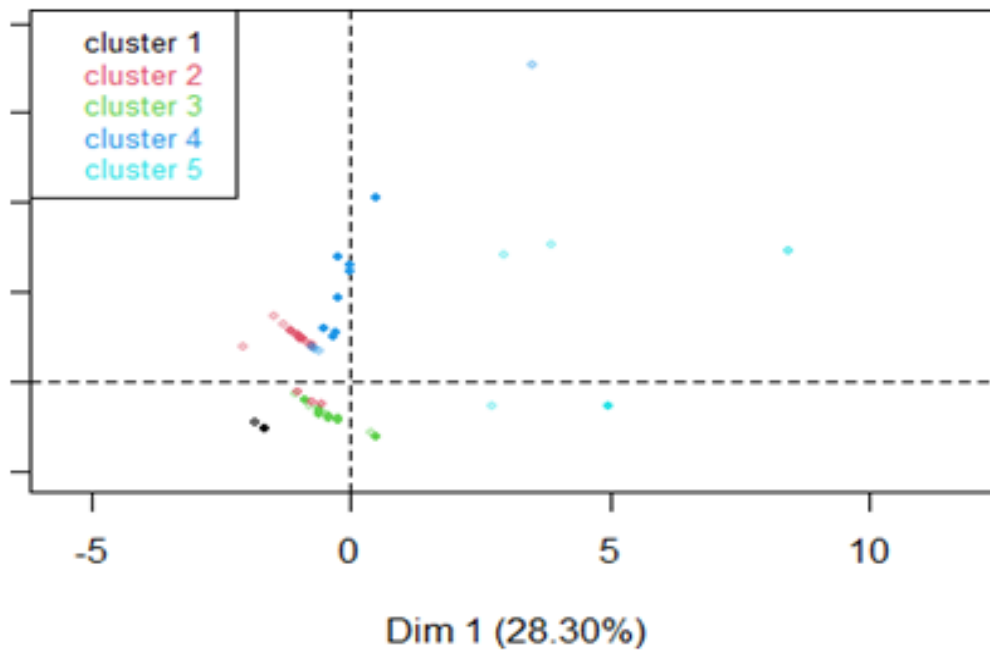


Figure 8 Hierarchical Ascending Classification of Individuals.

➤ *Difficulties and Recommendations:*

In general, high chick mortality at start-up, high land pressure, unprofitable chicken selling prices (6.70%), difficulty in accessing raw materials, veterinary inputs, limited technological skills (7.90%) and fraudulent entry of eggs (14.10%) as well as diseases (35.20%) constitute the major difficulties of farmers (Table 5).

Table 5 Difficulties in the Poultry Sector Mentioned by the Respondents.

Difficulties	Proportion (%) Of Difficulties Assessed In The Individuals Surveyed
Limitation of Technological Skills	7,9%
Chick Start-Up + Input Breakage	6,7%
Water	7,1%
Fraudulent Entry of Eggs	14,1%
Unavailability of medical inputs	0,1%
Non-existent workforce	7,2%
Disease	35,2%
Sales and fraudulent entry of eggs + quality of vaccination	0,1%
Field problem + outdated selling price of chickens	6,7%
Health and nutrition problems	0,5%
Problem of egg disposal during the winteringseason + diseases + shortage of veterinary inputs	6,5%
Infrastructure problems	0,3%
Financial problems	7,6%
Total	100,0%

The approaches to solutions proposed by the respondents reveal that 21% of the requests revolve around subsidizing food, followed by those including poultry inputs (20.10%). Also, 8.30% of the respondents requested training, financing, support for the construction of quality poultry buildings and the supply of chicks, poult or chicks and 7.30% in addition to training requested monitoring and technical support (Figure 9).

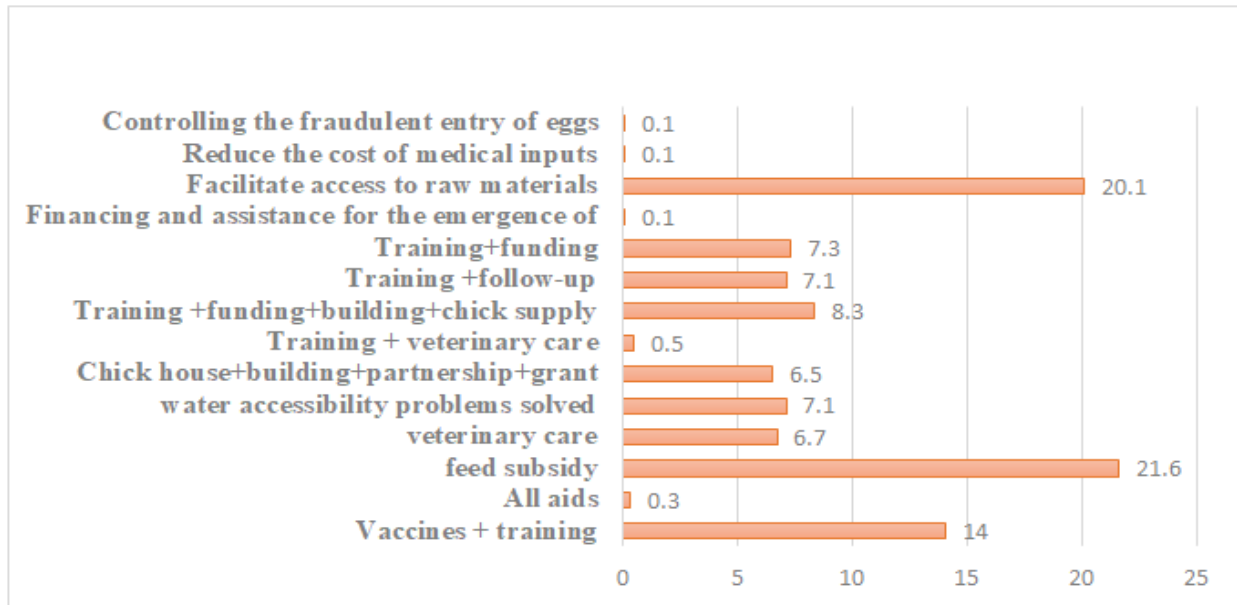


Fig 9 Proportion of Respondents Recommendations

IV. DISCUSSION

The predominance of men (66%) in local chicken farming in Burkina Faso is in agreement with the results of several authors ([11], [18]). This may be related to the customs of the peasantry, which stipulate that family responsibilities must be borne by the man, who is the primary family manager. It can also be explained by the intrusion of men into the decision to sell and therefore the ownership of the chickens. According to [13], it is due to socio-cultural considerations. However, our results are in this contradicts the findings of [12], which concluded that 56.6% of this activity was held by women. In reality, women seem to be more involved in poultry farming as owners or managers of the family property held by the husband. In addition, for security and cultural reasons, some women willingly declare their own property as their husbands'.

The strong predominance of chickens in the local poultry population corroborates the results of [12]; [24]; [11] [18] and [5]. Guinea fowl come second in terms of numbers, as stated in [5], which finds that this situation mainly concerns West and Central African countries such as Mali, Senegal, Togo and Benin, and Cameroon, in relatively unsophisticated farming systems.

The results of our analysis of phenotypic characteristics (neck-cloaca length, tarsal length, height) are in agreement with those published by [5] which states that the growth of the chicken goes with the age. For the local chicken, it reaches its maturity at six (06) months of age.

The elements that emerge from our analysis of the typology of the farms corroborate those of [5], which depict a very low level of intensification in poultry farming, with recourse to precarious shelters as rearing buildings; artisanal watering troughs and feeding troughs, generally made up of plates, or almost non-existent, with biosecurity measures

that are not generally applied. There are no facilities for quarantining animals. It should be noted that the acquisition of raw materials for food is difficult due to climate change and population growth, which creates a situation of food competition between humans and animals [22].

The range of raw materials listed as being used according to the agro-ecological zones surveyed corroborates the results of several authors who indicate maize as one of the raw materials most used in animal feed and especially in poultry feed [6], followed by cotton and soybean cakes and fish meal in the three agro-ecological zones. It is also noted that lettuce, cabbage and onion leaves are used in poultry feed in the southern Sudanian and Sudanian zones.

The information obtained from the processing of data resulting from the characterization of health management (mortality rate according to the rearing period) is consistent with that of [16], which explains it by a high mortality of chicks due to the lack of control of their rearing. Indeed, as biosecurity measures are not strictly applied, contamination is very recurrent and causes high mortality in the three agro-ecological zones, especially for local poultry. The breeding of exotic chickens is more or less controlled.

The above points show the low profitability of extensive livestock farming, which does not necessarily encourage the inflow of large sums of money. In the same way, the poor economic management due to the lack of training of these breeders does not favor the extension of their activity. The sectors are not well organized economically.

The difficulties encountered are common to those already found by other authors [21]; [27] which are essentially the high cost, inaccessibility and unavailability of poultry inputs such as raw materials which have seen a price increase. The price of a ton of maize rose to 28,000 CFAF in May 2021. The average cost of a kilogram of poultry feed has increased from 350FCFA in 2020 to 475FCFA in 2022.

The low participation of stakeholders in poultry farming training and the unsatisfactory quality of biosecurity are nonetheless contributing factors to this situation.

The needs for financing, training, monitoring and technical support, inputs and animal vaccination campaigns expressed by the producers are similar to those mentioned by [4].

V. CONCLUSION

This prospective study revealed that the technical level of poultry farms in Burkina Faso is very low. Indeed, 60.53% of the farmers surveyed have not received any training in poultry farming. Traditional poultry houses are the most common in the three agro-ecological zones. Raw materials for feed are mainly acquired by purchase. Although 682 of the 750 respondents stated that they vaccinated their animals, mortality rates averaging 21% in Harmattan were noted.

The income from the breeding depends on the number of birds and the quantity of eggs sold.

The difficulties encountered are, in addition to the high mortality of chicks at start-up, the high land pressure, the unprofitable selling prices of chickens, the difficulty of access to raw materials, veterinary inputs, the limitation of technological skills, diseases, fraudulent entry of eggs, the lack of quality equipment and infrastructure, the unavailability and high cost of raw materials and the ignorance of poultry feed manufacturing techniques.

To overcome these difficulties, training, monitoring, control of the entry of eggs at border crossings, funding, provision of quality infrastructure and subsidized feed are recommended to boost the poultry sector.

REFERENCES

- [1]. ABDOU I., BELL J.G. Dynamique de la volaille villageoise dans la région de Keita au Niger. In: Village poultry production in Africa, Proceedings of an international workshop, Rabat, 7-11 May 1992; 1992; 6- 11.
- [2]. ALDERS R. Poultry farming: a source of profit and pleasure. Food and Agriculture Organization of the United Nations: Rome, 2005, 21 p.
- [3]. Ayssiwede, S.B., Dienga, A., Houinato, M. R. B., Chrysostome, C.A. A. M., Issay, Hornick, J.L. and Missohou, A. 2013. Breeding traditional or indigenous chickens in Senegal and Sub-Saharan Africa: status and constraints. *Annals of Veterinary Medicine*, 157:103-119.
- [4]. BA Koki, DIOUF Awa D., BA Mamadou, LY Cheikh (2022). The success of commercial poultry farming in sub-Saharan Africa: The case of Senegal. *FARA Research Report 6 (04): Pp :44*
- [5]. BEBAY C.E. First assessment of the structure and importance of the commercial and family poultry sector in West Africa: synthesis of national reports (Benin, Cameroon, Mali, Niger, Senegal, Togo). Food and Agriculture Organization of the United Nations: Rome, 2006, 47 p. Ky, 2021
- [6]. Cothenet G., Bastianelli D., 1999. Raw materials available for poultry feed in hot zones: Broiler production in hot climates. Paris, ITAVI, p. 60-70 (1961).
- [7]. Dembele
- [8]. Goodman, L.A. (1961). Snowball sampling. *Annals of Mathematical Statistics*. 20, 572-579.
- [9]. FAO. 2018a. Country report- Sustainable livestock production in Africa 2050-Burkina Faso. Food and Agriculture Organization of the United Nations, Rome.
- [10]. FAO. 2020. Poultry Gateway
- [11]. F. K. Djitie, C MEGUENI, A. TEGUIA and D. L. BITOM, 2015. Socio- economic and technical survey of family poultry farming in the Adamaoua region, Cameroon. *Livestock Research for Rural Development*. Department of Biological Sciences, Faculty of Sciences, University of Ngaoundéré; BP: 454 Ngaoundéré-Cameroon. franckdjitie@gmail.com
- [12]. FOTSA J.C., ROGNON X., TIXIERBOICHARD M., NGOU NGROUPAYOU J.D., PONE KAMDEM D., MANJELI Y., BORDAS A. Exploitation of the local chicken (*Gallus gallus*) in the humid forest zone of Cameroon. *Bull. Anim. Health Anim. Afr.* 2007, 55, 59-73.
- [13]. GUEYE E.F. Village egg and meat production in Africa. *World Poultry Sci. J.*, 1998, 54, 73-86.
- [14]. HOFMAN A. Improvement of traditional poultry farming in the Comoros Islands: impact of semi-claustration and supplementation with local feed on the productivity of local poultry. (Thesis of end of study in Veterinary Medicine). Faculty of Veterinary Medicine, University of Liege: Liege, 2000, 71 p.
- [15]. KABORE N., 2016. Study of fodder production and conservation modes in Sahelian farms in Burkina Faso: the case of Dori and Gorgadji.
- [16]. LANCASTER, J.E., 1983. Incidence of poultry diseases: 5th conference of the OIE regional commission for Africa. *Rev. Sci. Tech. OIE*: 1081-1088. Yaro, 2011.
- [17]. MAPIYE C., SIBANDA S. Constraints and opportunities of village chicken production systems in the smallholder sector of Rushinga district of Zimbabwe. *Livest. Res. Rural Dev.*, 2005, <http://www.lrrd.org/lrrd17/10/mapi17115.htm>.
- [18]. MOULA N., Detiffe N., Farnir F., Antoine-Moussiaux N and Leroy P 2012. Family poultry farming in Bas-congo, Democratic Republic of Congo (DRC). *Livestock Research for Rural Development*. Volume 24, Article :74. Retrieved November 13, 2014, from <http://www.lrrd.org/lrrd24/5/moul24074.htm>.
- [19]. MRA, 2010. Livestock sector statistics. Burkina Faso.

- [20]. MRAH/ DGESS,2018. Rapport annuel d'activités du Ministère des Ressources Animales et Halieutiques. Burkina Faso.
- [21]. OUATTARA, 2008. Use of seeds of *Acacia macrostachya* Reichend. ex DC, as a source of protein in broiler feed. Thesis. Diploma of Advanced Studies in Integrated Management of Natural Resources. Specialty: animal production, option: nutrition and animal feed. Institute of Rural Development / Polytechnic University of Bobo-Dioulasso. 68p.
- [22]. OUATTARA, 2015
- [23]. POUSGA S., BOLY H., LINDERBERG J.E., OGLE B. Scavenging pullets in Burkina Faso: Effect of season, location and breed on feed and nutrient intake. *Trop. Anim. Health Prod.* 2005; 37, 623-634.
- [24]. RAACH-MOUJAHED A, MOUJAHED N and Haddad B 2011 Local poultry populations in Tunisia: Present and alternatives. A review. *Livestock Research for rural Development*. Volume 23, Article 96. Retrieved July 23, 2011, from <http://www.lrrd.org/lrrd23/4/raac23096htm>
- [25]. SONAIYA E.B., SWAN S.E.J. Family poultry production: a technical manual. *Animal Production and Health*. Food and Agriculture Organization of the United Nations: Rome, 2004, 134 p
- [26]. TADELLE D., OGLE B. Village poultry production systems in the central Highlands of Ethiopia. *Trop. Anim. Health Prod.* 2001,
- [27]. YARO. D., 2011. Effect of moringa *aleifera* leaf powder and *parkia biglobosa* fruit pulp on laying performance of laying hens. 33p.
- [28]. URL: <https://briefingsbruxelles.files.wordpress.com/2009/02/r8fr1.pdf>